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PERSPECTIVES 90

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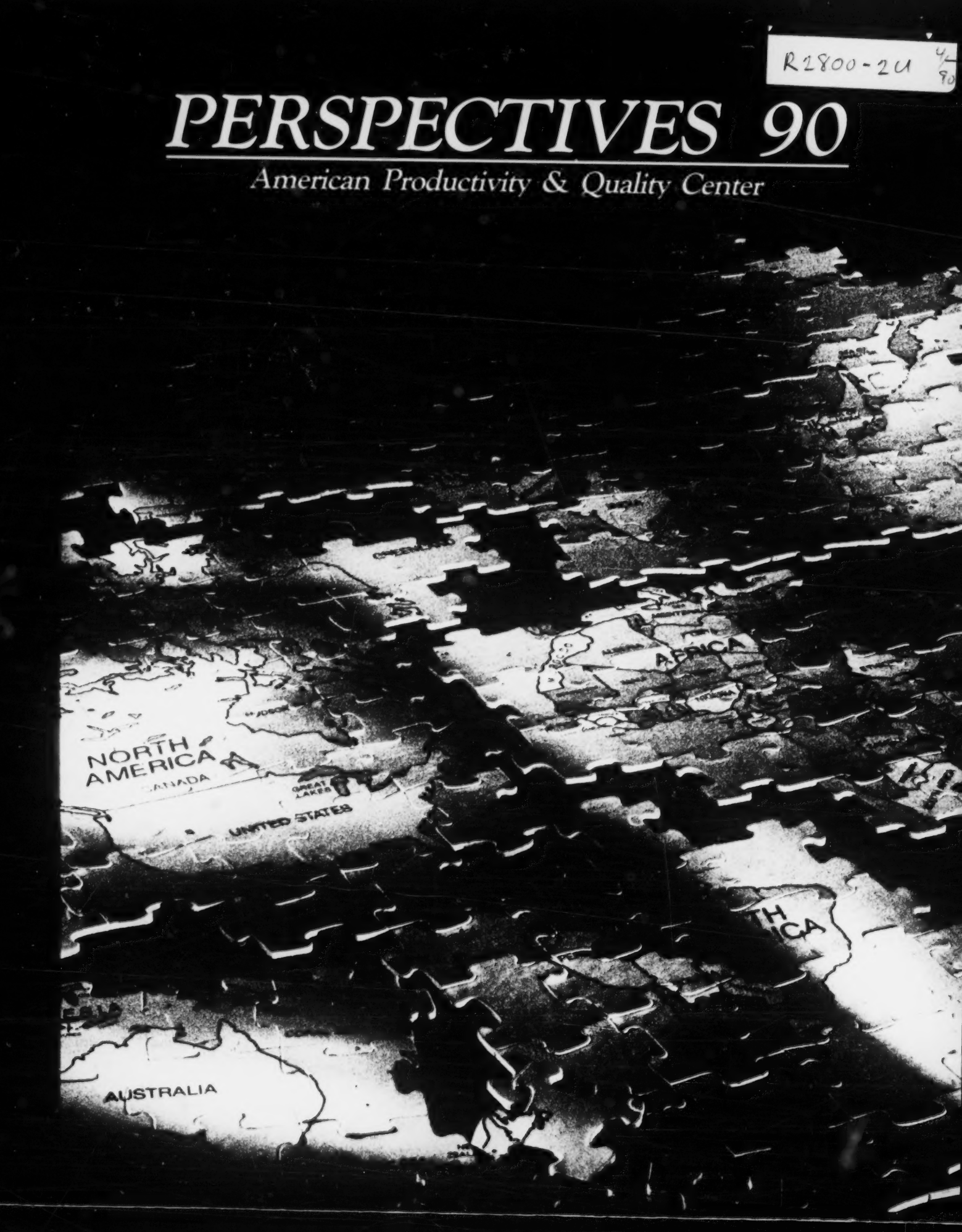

Perspectives

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Perspectives

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Introduction

The U.S. had a good year in productivity in 1988, but 1989 data are mixed at best and the 1990-91 outlook appears poor unless atypical political statesmanship develops quickly. U.S. manufacturing has done well in the last half of the 1980s with many fine examples of corporate and industry improvement. Unfortunately, and permanently, the international competition is a moving target; others are performing in the same effective ways. Often their growth is faster and more widespread. For the decade, U.S. manufacturing has had two helpers: dollar weakness has kept our products and services competitive in price, and U.S. manufacturers and manufacturing workers have agreed implicitly, if not explicitly, on wage restraint. The workforce does not see increases in real compensation, but it does at least remain employed. The Europeans, especially, have not learned this yet.

U.S. service industries have had a poor statistical record in productivity for the last 20 years, their growth rate about 2.5 percent slower than manufacturing's. Recent studies show some sectors of service productivity have been systematically understated in the period, but that narrows the gap at most about one point. Close observers are concluding that simple office automation, which was the basis of earlier service growth plans, results in improved quality of information in both timeliness and content. But it does not automatically result in a net decrease in the workforce (nor is it likely to). Manual data handlers of the 1950s have been replaced in the 1980s by another layer of analysts and computer specialists. Now the service industries have to do the harder thinking: which whole services and departments are not needed anymore?

The outlook for the 1990s is largely dependent on how much capital is finally available for expansion and how well it is used. Currently, we depend on Japanese investors for the extra money flow above and beyond what is required to finance the budget and trade deficits. Can that continue as Japan meets its own set of new problems? If the capital can be found to move us beyond almost full utilization of manufacturing capacity, will it go to productivity and quality improvements and selected capacity expansions? Or will it continue to be siphoned off (actually firehosed off) to leveraged buyouts and other nonproductive financial transactions? Any recent prediction that depended on political statesmanship or long-range thinking on Wall Street has been wrong. So we're facing a tough time in the 1990s.

I. *U.S. Productivity Performance*

Figure 1

For 20 years after World War II, the U.S. was able to expect labor productivity improvement of between 2 and 3 percent per year. It is unrealistic to expect a direct continuation of this record, since there is now sophisticated world competition in all industries. But the U.S. should be able to do better than the 1 percent growth rate of the past decade. Figure 1 shows labor productivity growth of 2.1 percent per year in the 1982-86 boom and again in 1988, but on the other hand productivity growth can turn negative, as it did in 1978-82.

In the last decade, manufacturing labor productivity growth has been about two points higher than growth in the private sector (nonfarm) as a whole. Nonmanufacturing, essentially the service industries, has been 1/2 to 1 point below the private sector through the 1980s. Since nonmanufacturing is about 3/4 of the total, it sets much of the national statistical pace even though manufacturing is generally considered by economists to be the value-driver of the economy.

Studies by John Kendrick and Martin Baily have made various good estimates concerning the understatement of service industry growth caused by government statistical timidity.* Some hard-to-measure sectors are given a zero growth assumption (output defined as equaling labor input) rather than a best guess from indirect indicators. This may account for a total of 1 percent per year for the service sector and perhaps up to 0.5 percent for the private economy as a whole. However, it is likely that other countries take the same shortcuts, so the understatement does not extend to international comparisons. As shown in Section III, this is where the real problem arises.

Figure 2

Figure 2 shows recent U.S. performance in multifactor productivity, which puts capital in the denominator along with labor and is a much better overall measure of balanced national performance when it can be found. The pattern shown in Figure 2 is similar to that in Figure 1, except that the poor capital productivity performance of the 1970s is highlighted. This is a combination of premature expansion in several industries and the effects of the energy crisis and abrupt environmental regulation. As we have approached full capacity utilization in recent years, multifactor productivity has behaved similarly to labor productivity.

* Kendrick, John W. "Productivity Performance Better Than the Numbers Indicate." Second International Conference on Productivity Record, Miami, Florida, 1989.
Baily, Martin and Gordon, Robert. Brookings Economic Papers, 1988.

Figure 1

U.S. Labor Productivity Growth

Period	Annual Percent Growth Non-Farm Private Business	Manufacturing	Estimated Non-Farm, Non-Manufacturing
1968-78	1.3 %	2.6 %	0.9 %
1978-82	(0.4)	1.2	(0.9)
1982-86	2.1	4.7	1.3
1987	1.1	3.7	0.3
1988	2.1	3.6	1.6
Last 12 months (October 1988 - September 1989)	1.0	2.4	0.5

Source: BLS, APQC

Figure 2

U.S. Multifactor Productivity Growth

Period	Annual Percent Growth Private, Non-Farm Labor Productivity	Capital Productivity	Multifactor Productivity
1968-78	1.3 %	(0.9) %	0.5 %
1978-82	(0.4)	(4.4)	(1.8)
1982-86	2.1	1.6	2.0
1987	1.1	0.7	1.0
1988	2.1	N/A	N/A

Source: BLS

Figure 3

The level of labor productivity in 1987 in selected industries is shown in Figure 3. This type of data is often mistaken for a performance measure. It is not; it is essentially a measure of relative labor intensity. The oil refining industry is not "good" and the shoe industry inherently "bad" unless the economy concerned has relatively high-cost labor, as do the U.S. and Japan. These low-productivity industries are the more obvious candidates for removal to a low-wage country, with the capital and labor thus conserved being converted to "better" use in a less labor-intensive industry. Companies in the lower-ranked industries may be doing just fine thanks to aggressive improvement efforts, good marketing margins, and/or high service levels.

Figure 3

Labor Productivity Level, 1987
Selected Manufacturing Industries

SIC	Industry	$000 Value of Shipments/ Employee
2911	Oil Refining	1,345
211-13	Tobacco	515
2821	Plastics	475
3711	Motor Vehicles	448 *
2082	Beer	392
262, 263, 266	Paper	224
283	Pharmaceuticals	221
3312, 3315-17	Steel Mills	204
2032-35	Canned Food	193
3573	Computer	164
372, 376	Aerospace	132
3674	Semiconductors	109
3561	Pumps	104
3541	Metal Cutting Machinery	93
22	Textiles	87
2711	Newspapers	75
23	Apparel	58
314	Shoes	56

* 1986 Data
Source: Department of Commerce

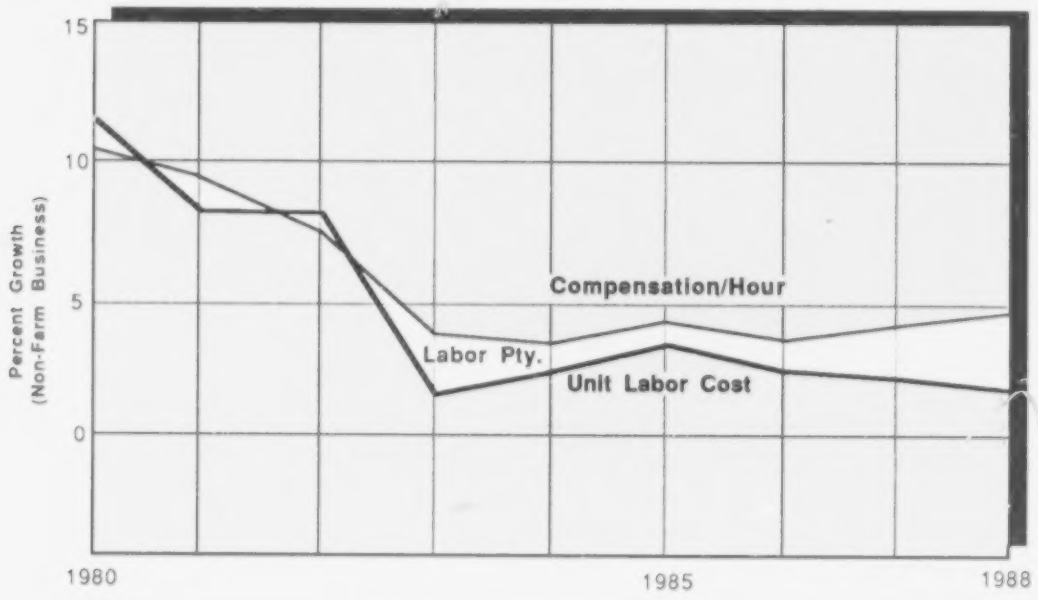
Figure 4

Of great interest to all of us is our standard of living. This can be expressed in level of assets owned (televisions, cars, or square feet of housing per capita), but in that context our standard of living is generally controversial. From a "flow" point of view, a nation is improving its standard of living if it is increasing the real compensation per hour of its workforce. Most U.S. citizens are surprised to find that the U.S. has not improved its real compensation per worker in the last ten years. U.S. prosperity in this period has been built on an increase in workers per family. Whether the incremental worker is liberated or oppressed by the experience determines whether the family standard of living has increased. The movement of real compensation per hour components is shown in Figure 4. Clearly, the final statistic is mainly driven by labor productivity. Reasonable wage restraint coupled with good productivity improvement is the best outcome for the firm. Somewhat less wage restraint—but also labor productivity improvement—is the best outcome for the worker. Why then can't firm and workforce cooperate to improve labor productivity and separate that from legitimate arguments over the wage restraint issue? As will be shown in Section III, it has been wage restraint more than productivity improvement that has saved U.S. manufacturing industries in recent years relative to Europe (but not Japan). This is because wage restraint, along with productivity, determines change in unit labor cost.

Figure 4

Productivity and Standard of Living

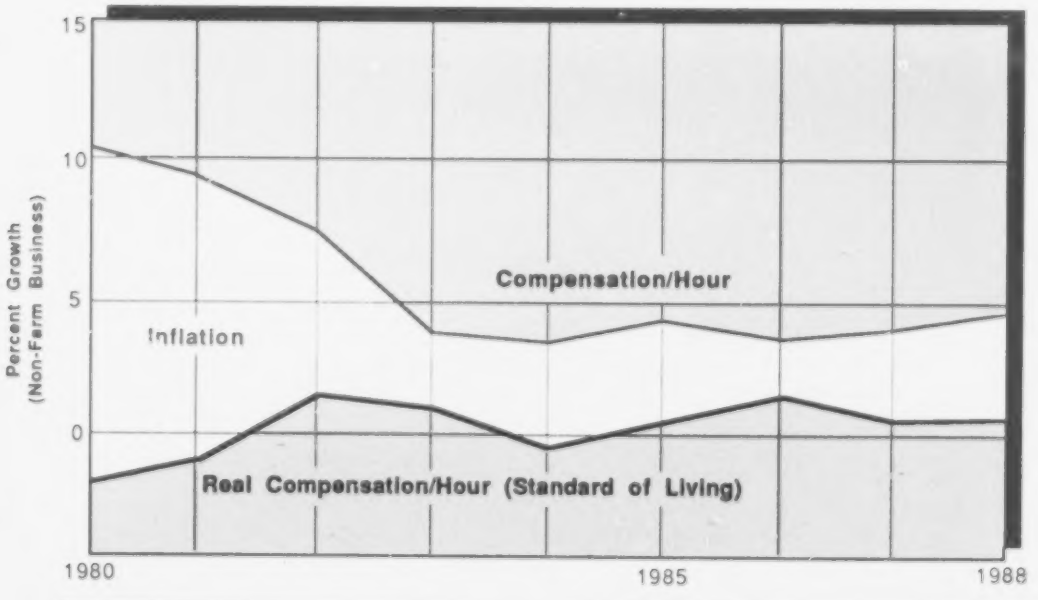
a. Business View



Source: BLS

Productivity and Standard of Living

b. Worker View



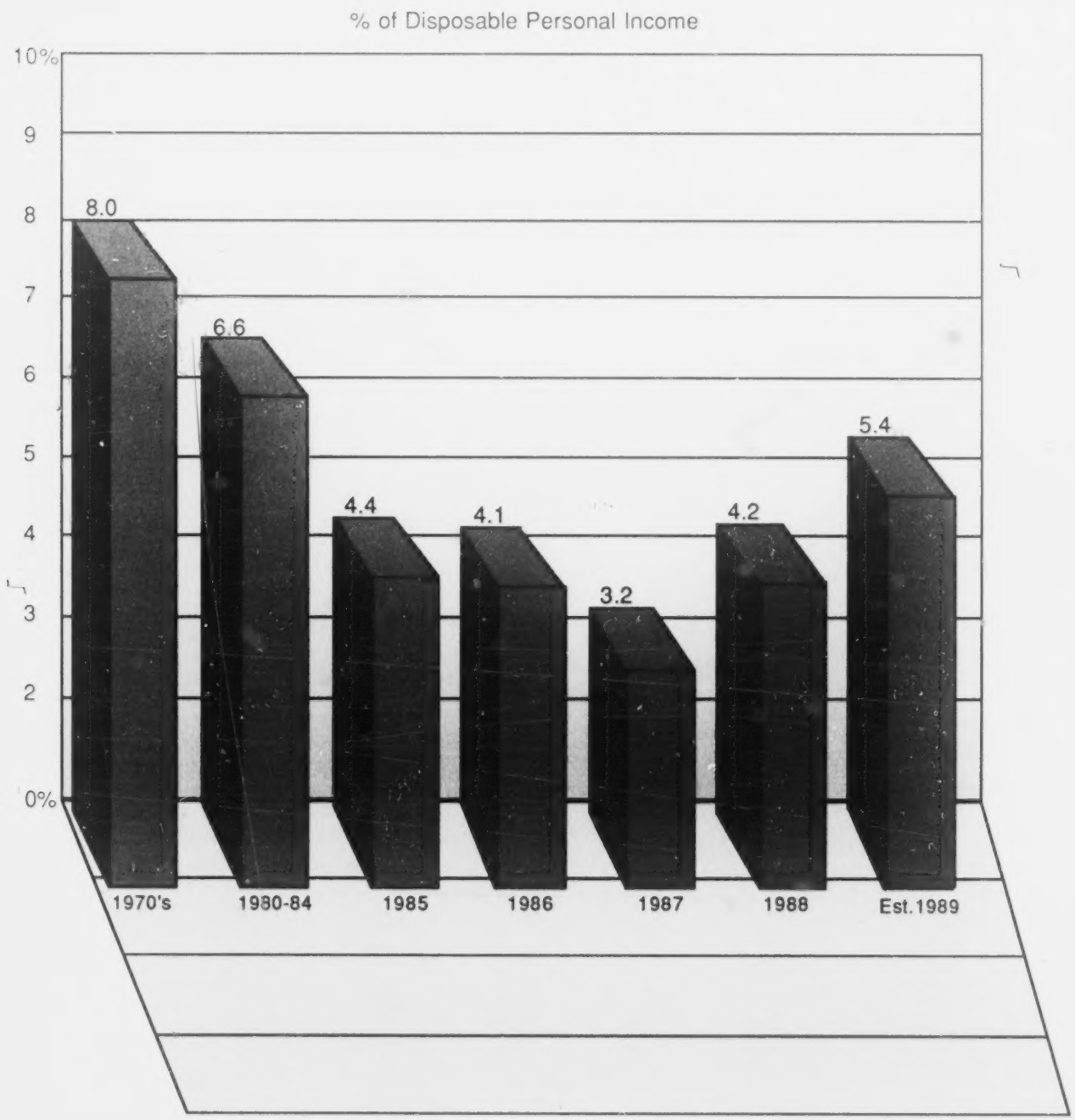
Source: BLS

Figure 5

Somehow the growth of the U.S. economy has to be financed. Most countries do it with personal savings. Figure 5 shows that the U.S. has had to find other ways, because its savings rate is poor and (until recently) declining. Though there are inevitable differences in how the savings rate is calculated from nation to nation, the U.S. was among the lowest of leading nations when its savings rate was 8 percent. The rate hit a low point of 3.2 percent in 1987, but has moved up a couple of points since.

Figure 5

U.S. Personal Savings Rate



Source: Economic Report of the President, Department of Commerce, Goldman Sachs

Figure 6

When the savings rate is low, the country must import capital from other countries. When the country has both a low savings rate and a formidable (3 percent of gross national product) federal deficit, the dependence on foreign inflows is accentuated. Though "putting the U.S. on sale" offends some people, sufficient taxation and spending restraint apparently offend them more, because they keep electing congresspeople to continue failed policies. Figure 6 demonstrates the sudden rise of the federal deficit in the "Reagan years."

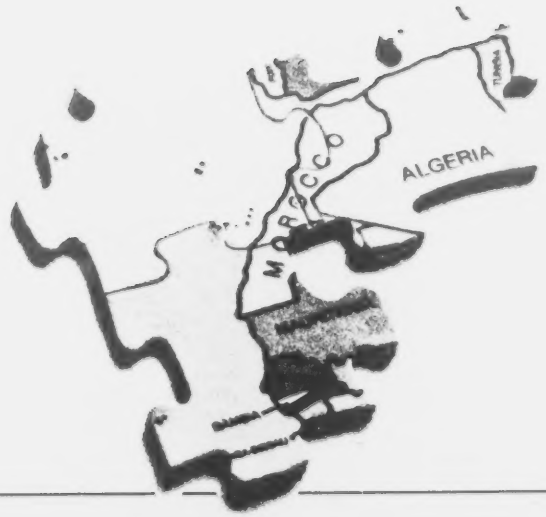
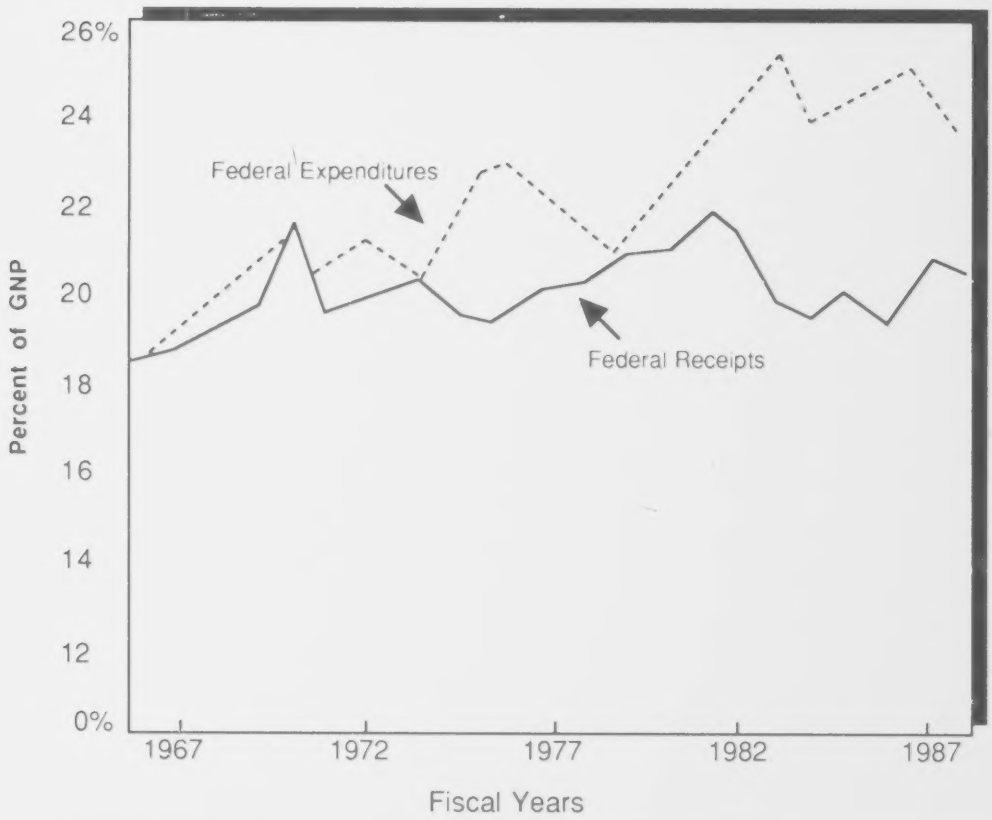


Figure 6

Federal Receipts and Expenditures as Percent of GNP *



* Data are on a national income and product accounts basis
Source: Department of Commerce

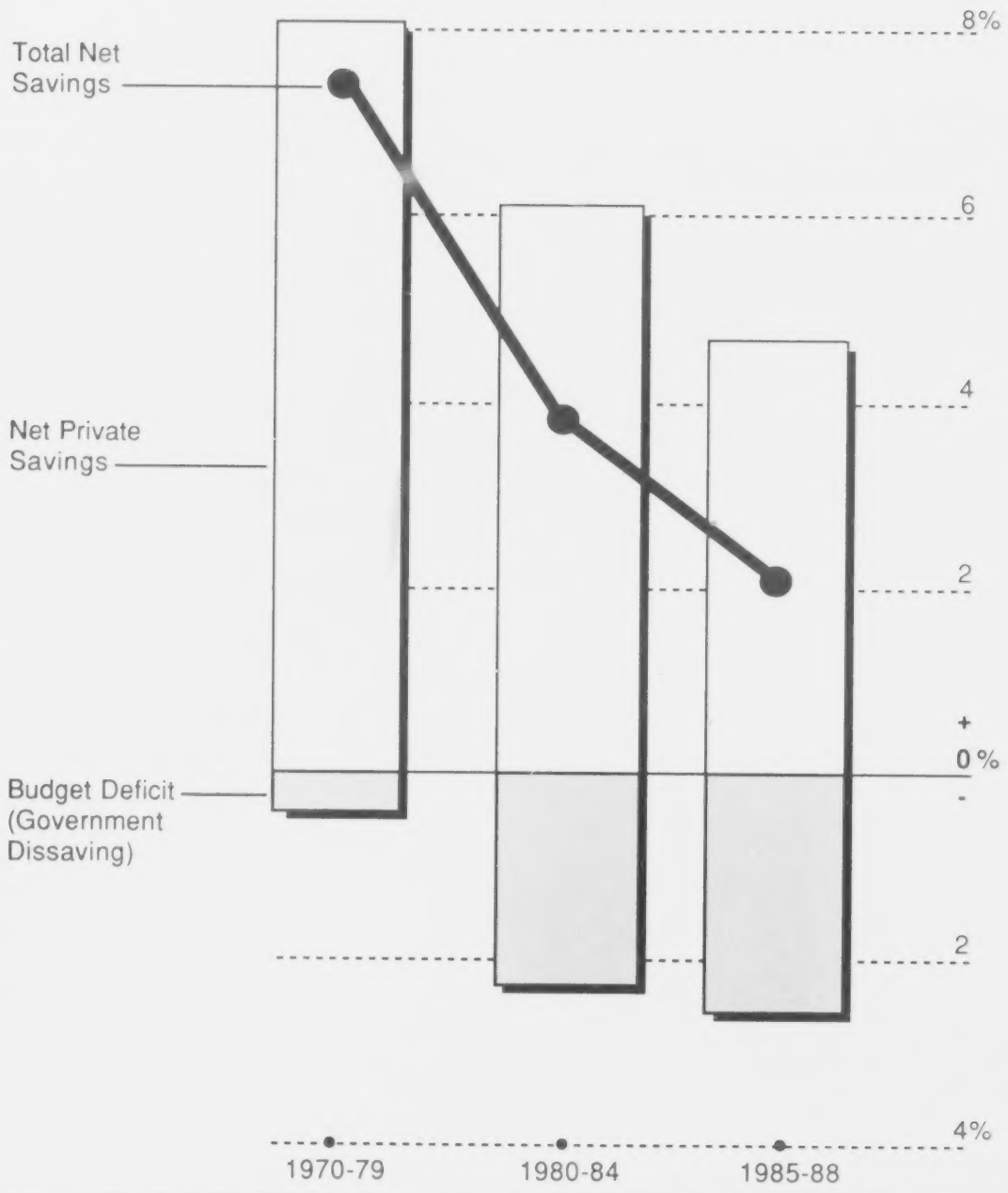
Figure 7

Figure 7 presents another view of the savings-deficit interrelation. It is the total net savings plunge that was made up by foreign inflows.

Figure 7

U.S. Domestic Savings

as Percent of GNP, Annual Averages



Source: Congressional Budget Office, *The Economist*

II. *Interpreting U.S. Performance*

Figure 8

High capacity utilization, as shown in Figure 8, is good news in the short run. Overhead is spread over maximum volume and profits flow. But what happens next is the difficult question; who in the industry, if anyone, should expand? If no one expands, everyone continues making money until foreigners expand, open up price (and maybe quality) advantages, and seize the initiative. If everyone expands, the honeymoon is over for everyone except the customer, who will benefit from lower domestic prices. But most companies are both customers and suppliers, and a little weakness in one place is offset by tightness elsewhere.

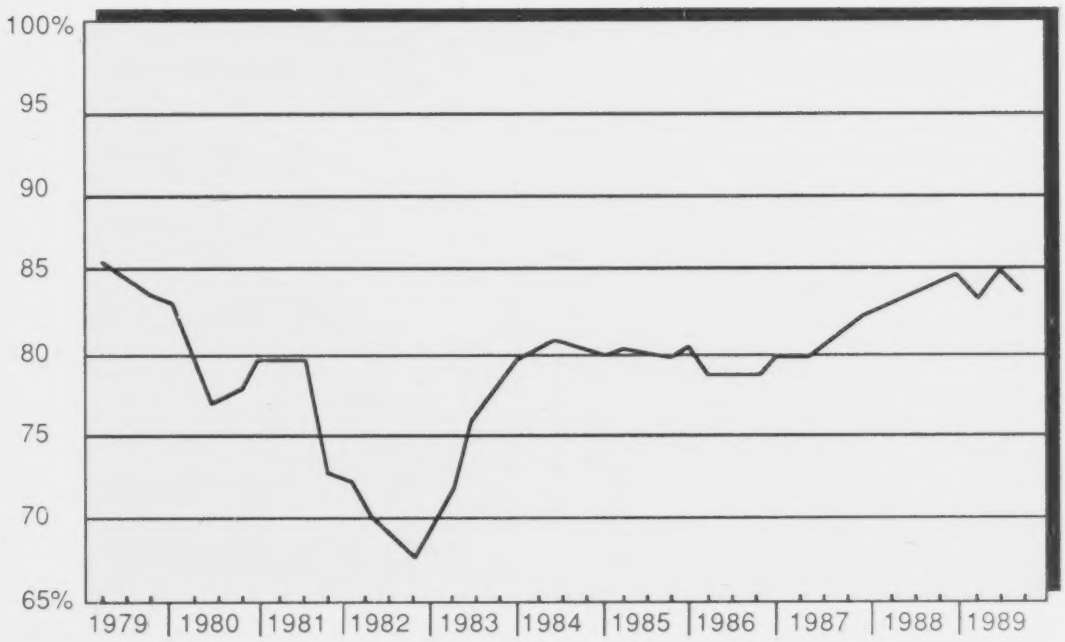
It is important for an economy to keep the capital investment flowing. Thus, an average capacity utilization (say 75-80 percent) is the best long-term position. To return the U.S. to that position will require the removal of bottlenecks and even pure expansion in several industries, especially the "smokestack" industries that have been capital starved lately. But investor money has been going into growth industries and takeover situations. A continuation of the good manufacturing productivity growth of the late 1980s will demand more investment in manufacturing than appears to be scheduled.

Figure 9

Figure 9 shows the ratio of cash flow (less inventory profits) divided by business fixed investment, an indicator of whether cash flow is being reinvested. Whereas 80 to 90 percent of cash flow was being reinvested in the 1982-87 period, the recent number is about 75 percent and headed to 70 percent in the next few quarters. Increasingly, cash flow pays interest on takeover and restructuring debt.

Figure 8

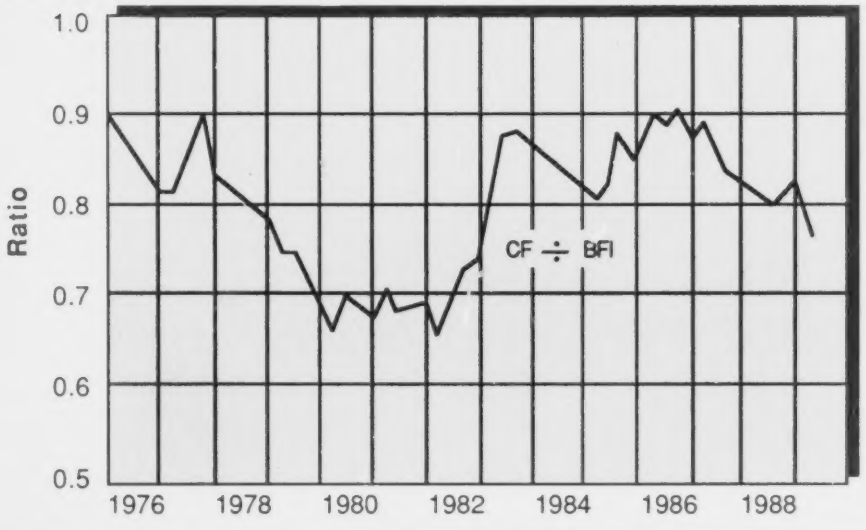
Capacity Utilization, Manufacturing, 1979-1989



Source: National Science Foundation

Figure 9

Source of Funds for Capital Spending, 1976-1989



Source: Goldman Sachs

Figures 10 & 11

But there is some good news. R&D as a percent of GNP is maintaining a good historical level (Figure 10) and inflation continues under reasonable control (Figure 11).

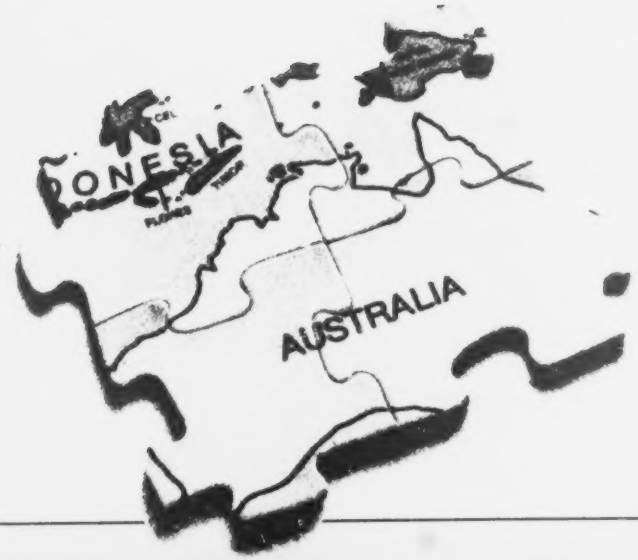
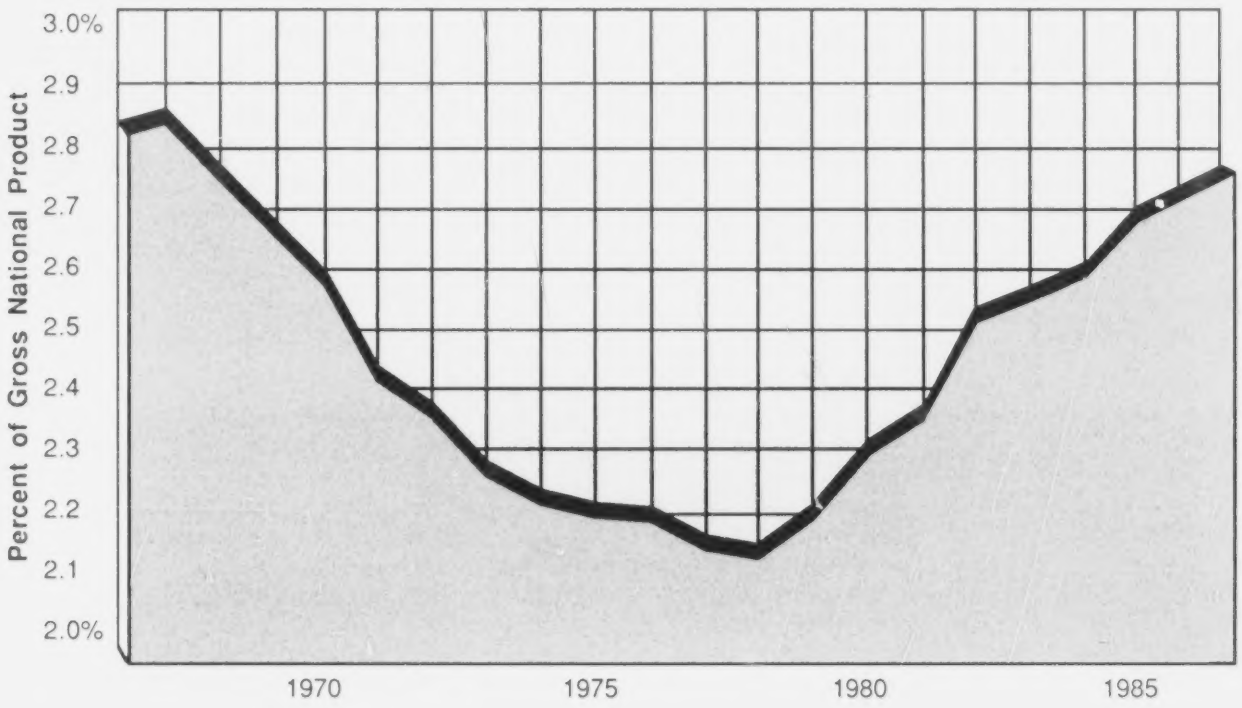


Figure 10

U.S. Research and Development, 1966-1987



Source: National Science Foundation

Figure 11

Specific Inflation (Annual Percent Increase)

	1979-81 Average	1982-84 Average	1985-87 Average	1988 Average
CPI, Urban, Total	11.7%	4.9%	3.0%	4.1%
Food	9.0	3.4	3.2	4.1
Housing	13.1	4.7	3.3	3.8
Transportation	14.7	3.6	0.6	3.1
Medical	10.3	8.9	6.8	6.5

Source: U.S. Department of Labor

III. International Productivity

Figure 12

The U.S. continues to be the leader among major industrialized countries in labor productivity level. Figure 12 shows a five-point lead over Canada and a 15-point lead over France and Italy. It is critical to note that this calculation is based on purchasing power parity and not on exchange rates. This provides a smoothing effect and is generally a more fundamental indicator of economic strength than market exchange rates at any arbitrary period. If market exchange rates of 1988 were used, for example, Canada was the world leader in 1974-77. Several European countries passed the U.S. in 1978-80 and were in turn re-passed by the U.S. in 1981. France, Germany, and Japan passed us again in 1987 and would still be ahead today. By using another year's exchange rates, a different story emerges.

On the purchasing-power-parity basis, extrapolating the 1979-88 improvement rates to the future, Figure 12 shows that France will pass the U.S. about 2004, Japan will pass France a couple of years later, and Korea will lead the world about 2018. Simple extrapolation of this sort is not sound, but if one gives any credence to the 1992 European integration plans, France, Italy, and Germany should pass the U.S. in the first decade of the twenty-first century. If Japan can find a way to solve upcoming challenges, such as a rapidly aging population and a consumption-oriented society, it should pull even with the European group by that time.

Figure 13

Of course the true competition is industry-by-industry, not nation-to-nation. A good living is possible if a country takes advantage of those products and services in which it has a competitive advantage. But the pride of being the leader is an essential part of the world view of U.S. business leaders, and they presumably will be stirred into action before Armageddon (however statistical it may be) appears.

Figure 13 shows labor productivity growth in the manufacturing sector. Here U.S. performance is relatively better, but still behind that of Japan and part of Europe.

Figure 12

International Labor Productivity
(GDP/Employee, Purchasing Power Parity)

Country	1988 Level (US = 100)	Average % Growth 1979 - 88	Hypothetical Relative Levels * 2000	2010
United States	100.0	1.0%	100	100
Canada	94.6	1.2	97	99
France	85.6	2.0	96	106
Italy	85.1	1.9	95	104
Germany	81.0	1.6	87	92
United Kingdom	71.6	1.8	79	85
Japan	71.5	3.0	90	110
Korea	39.3	5.5	66	103

* Using 1979-88 Growth Rates
Source: BLS

Figure 13

International Manufacturing Labor Productivity
(Percent Growth per Year)

	1983-88	1978-83
Japan	5.9%	5.7%
UK	4.7	3.9
Italy	4.3	4.9
US	4.0	2.0
Canada	3.3	0.8
France	2.9	3.7
Germany	2.7	2.9

Source: BLS

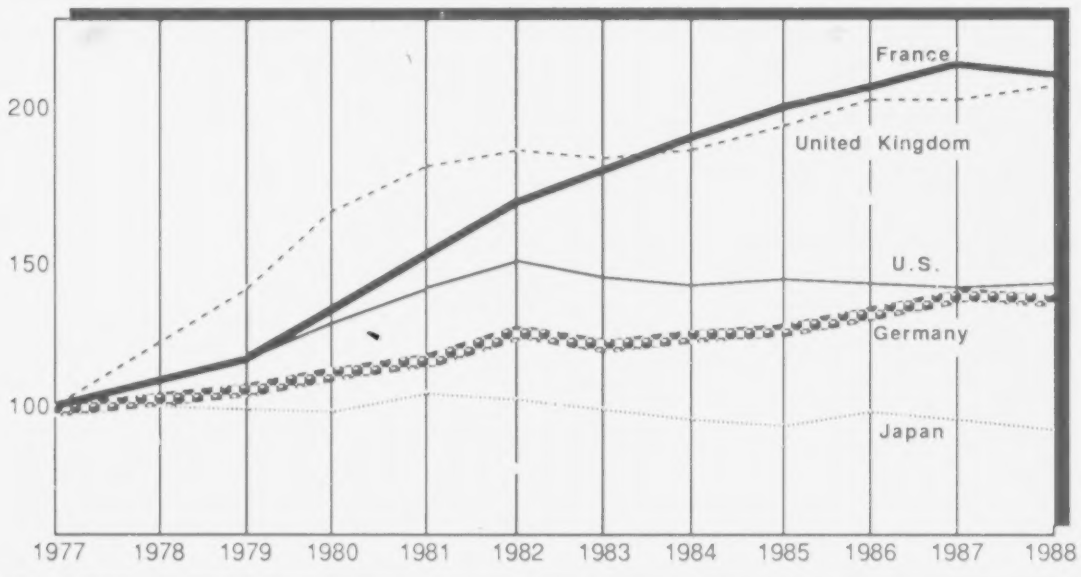
Figure 14

As suggested above, a major U.S. strength in recent years has been wage restraint. Figure 14a shows that the U.S., Japan, and Germany have managed to avoid increases in unit labor cost on a national currency basis in the past six years, whereas France and the United Kingdom (and most other European nations) have let unit labor cost keep rising through high wage settlements. Figure 14b shows that the U.S. is in the unique position, due to the weakness of its currency, of having no unit labor cost increase since 1982 while everyone else, including Japan and Germany, has had substantial increases in unit labor costs when calculated on a dollar basis. One wonders why U.S. exporters did not thoroughly dominate the world in this period. Instead, they merely did fairly well in export increases. One also wonders how importers to the U.S. have been able to maintain and actually increase volume in the face of such a disadvantage. The presumed answer is the quality of imported products and services!

Figure 14

Increase in Unit Labor Costs in Manufacturing

a. National Currency Basis*

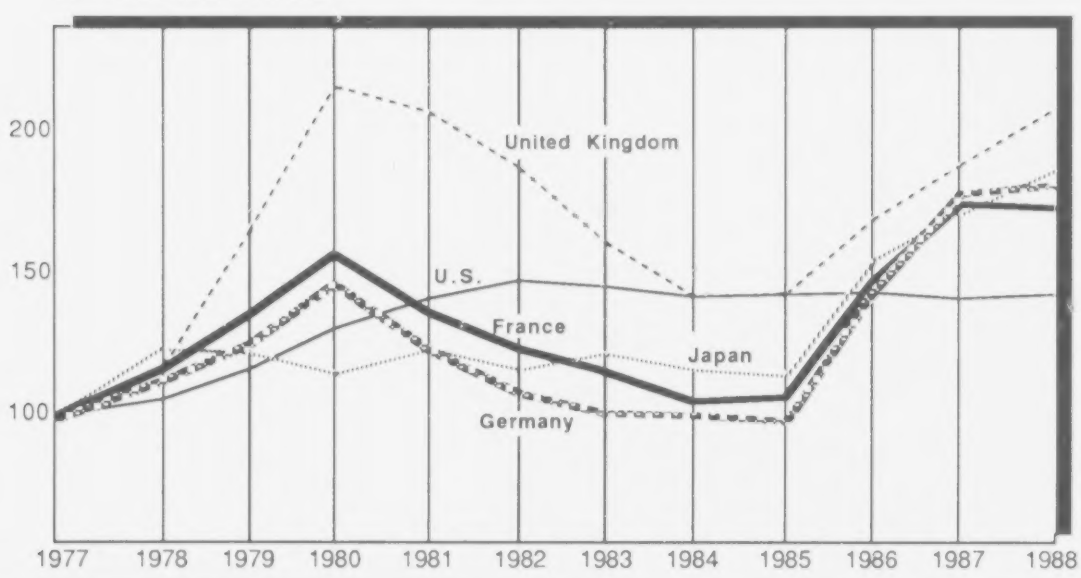


* 1977 = 100

Source: U.S. Department of Labor, Bureau of Labor Statistics

Increase in Unit Labor Cost in Manufacturing

b. U.S. Dollar Basis*



* 1977 = 100

Source: U.S. Department of Labor, Bureau of Labor Statistics

Figure 15

Figure 15 brings in the rest of the world. The only data available for many countries is GNP per capita. This is more a social indicator than an economic one, but it gives a rough idea of standard of living, and shifts up and down are interesting.

Figure 15

Level of GNP per Capita for the Top 45 Reporting Countries, 1987

$000/Capita	Western Hemisphere	Europe	Pacific Basin	Africa & Near East
18.6 +		Switzerland		
18.5	United States			
12.8-18.4	Canada	Norway Sweden Denmark West Germany Finland France	Japan	United Arab Emirates Kuwait
10.3-12.7		Austria Netherlands Belgium United Kingdom Italy	Australia	
4.0-10.2	Trinidad	Ireland Spain Greece	Hong Kong New Zealand Singapore	Saudi Arabia Israel Oman Libya
1.8-3.9	Venezuela Argentina Surinam Panama Uruguay Brazil Mexico	Portugal Yugoslavia Hungary Poland	Korea Malaysia	Gabon Algeria South Africa

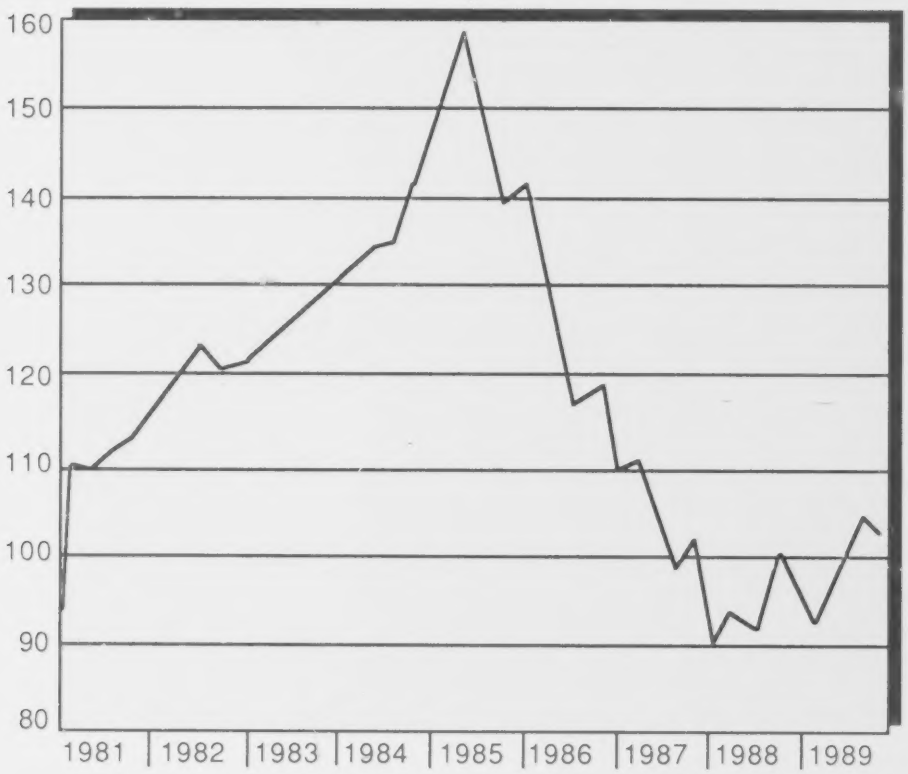
Source: World Bank

Figure 16

Figure 16 shows a slight recovery of the dollar on a trade-weighted basis, but how slight it is should remind us that our exporters are still in a relatively privileged position.

Figure 16

U.S. Dollar Trade-Weighted Exchange Rate *



* 1977 = 100

Source: U.S. Department of Commerce

Figure 17

Figure 17 is the regular review of economic factors in several countries. Notable changes in the past year are the general abating of the Thatcherian miracle in the United Kingdom, startling inflation in Japan (though still trivial by world standards), and good improvement all around in West Germany.

Figure 17

World Economic Factors

	Real GNP Growth		Consumer Price Inflation		Unemployment
	Average % per Year 1984-87	% Last 12 Months *	Average % per Year 1984-87	% Last 12 Months *	% Latest *
Australia	3.9	3.9	N/A	7.6	5.9
Belgium	1.9	N/A	3.6	3.0	10.6
Canada	4.4	2.5	4.2	5.2	7.4
France	1.8	3.2	4.8	3.4	9.5
Italy	3.0	3.1	7.5	6.6	16.6
Japan	4.0	4.8	1.2	2.6	2.3
Netherlands	2.3	2.9	1.5	1.1	5.8
Spain	3.8	N/A	N/A	6.6	17.3
Sweden	2.6	2.9	N/A	6.3	1.5
Switzerland	2.8	1.4	N/A	3.0	0.5
United Kingdom	3.1	2.2	4.6	7.3	6.1
United States	4.0	3.0	3.3	4.7	5.2
West Germany	2.4	4.9	1.2	3.1	7.8

* Last 12 months for GNP is usually July 1988 - June 1989
Last 12 months for inflation is usually September 1988 - August 1989
Latest for unemployment is usually August 1989

Source: *The Economist*, Central Intelligence Agency

Figures 18 & 19

Figure 18 demonstrates why the Japanese continue to ship money out, but not to Europe with its apparent real interest rates higher than those in the U.S. Figure 19 shows cross-border equity flows, emphasizing the Japan-to-U.S. flow, but also indicating that Other Europe is also investing in the U.S. May it continue (without higher interest rates being needed)!

Figure 18

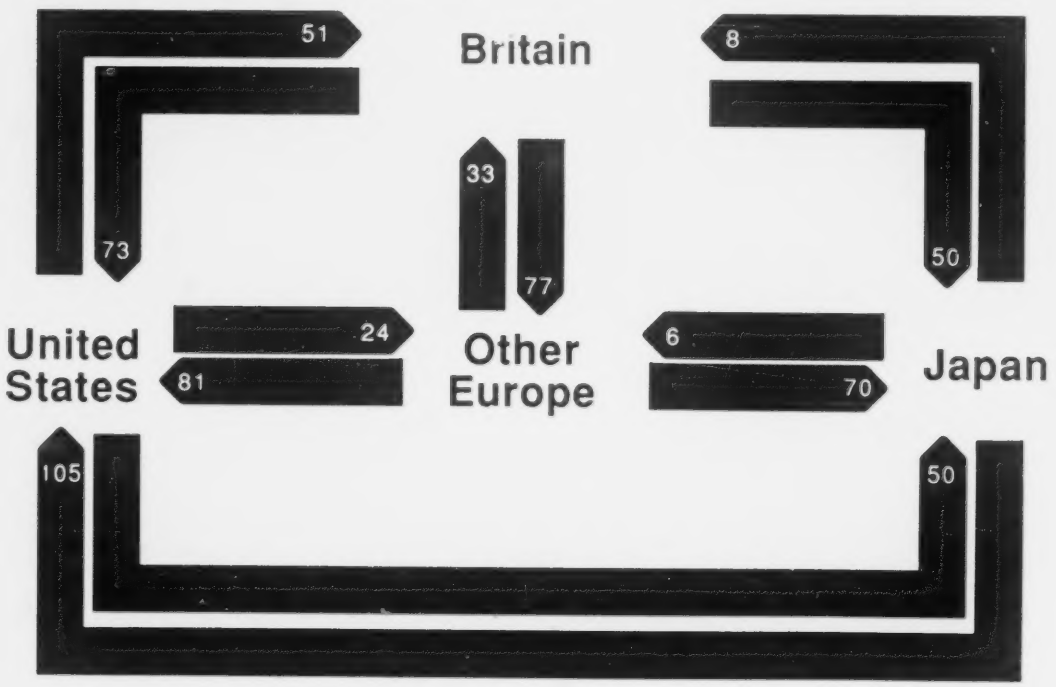
Money Markets, October 1988

	Nominal Interest Rates *	Last 12 Months Inflation	Real Interest Rates
United States	8.8%	4.7%	4.1%
Canada	12.3	5.2	7.1
France	9.6	3.4	6.2
Italy	12.9	6.6	6.3
West Germany	7.4	3.1	4.3
United Kingdom	14.6	7.3	7.3
Japan	5.0	2.6	2.4

* 3-Month Money Market
Source: *The Economist*

Figure 19

Gross Cross-Border Equity Flows, 1988 $ Billions

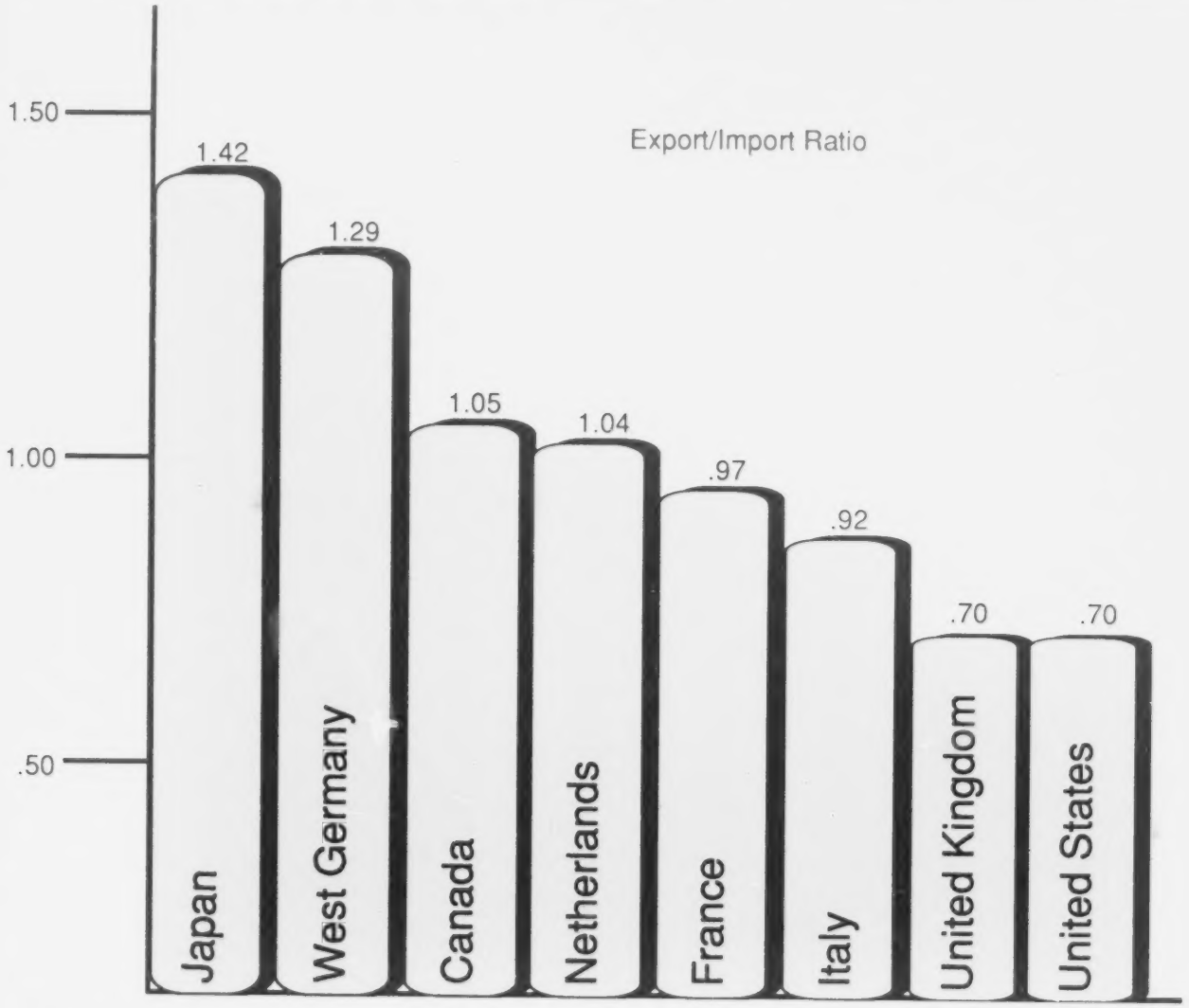


Source: Salomon Brothers

Figure 20 International trade balances are calculated in Figure 20. The U.K. has joined the U.S. at the preposterous 0.7 level.

Figure 20

International Trade Balances, 1988



Export (FOB)	$Billions	Imports (CIF)
322	United States	460
167	France	173
323	West Germany	250
128	Italy	139
103	Netherlands	99
133	United Kingdom	189
265	Japan	187
112	Canada	107

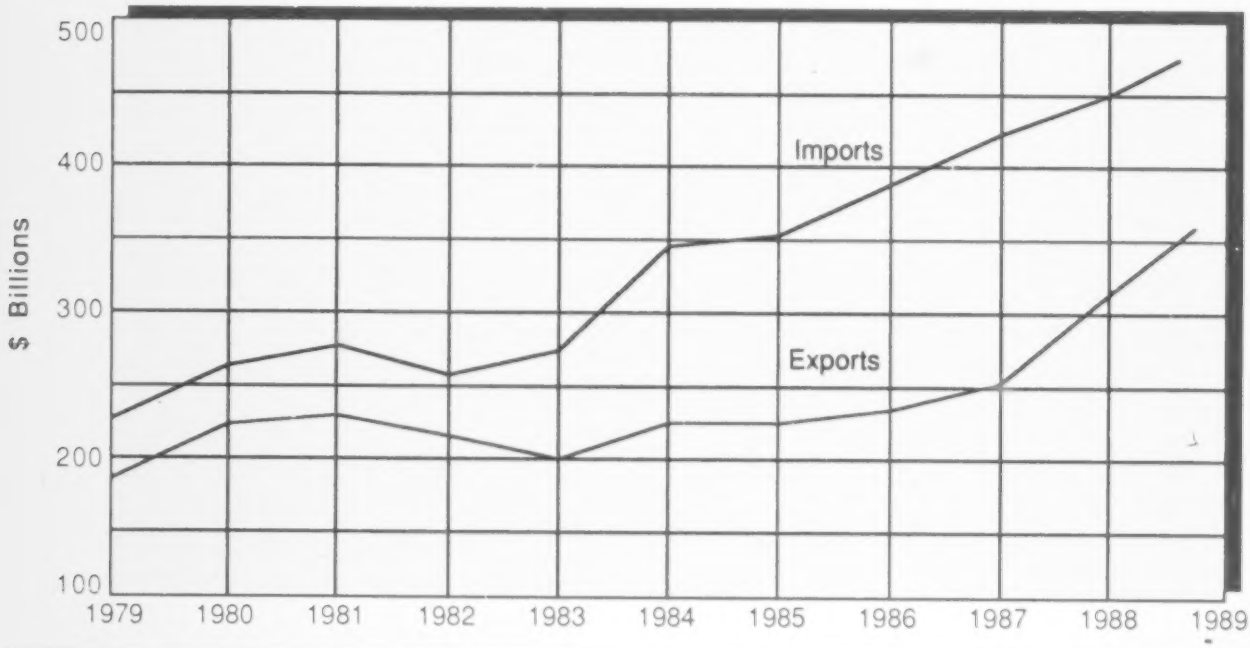
Source: Organization for Economic Cooperation and Development

Figure 21

Figure 21 shows the development of the U.S. trade deficit. As suggested earlier, why haven't U.S. exports increased even faster, given the large currency and unit labor cost advantages, and why have imports continued to increase in the face of such disadvantages?

Figure 21

Development of the U.S. Trade Deficit



Source: Organization for Economic Cooperation and Development

Figure 22

Foreign direct investment in the U.S. is tabulated in Figure 22. Japan is only third in position, behind the U.K. and Other Europe, and barely ahead of the Netherlands. Japan is strongest percentagewise in wholesale trade, real estate, and banking. Its manufacturing position, large in dollars, is still only 10 percent of foreign manufacturing investment.

Figure 23

Figure 23 shows that Japanese companies contributed over 10 percent of U.S. exports in 1985!

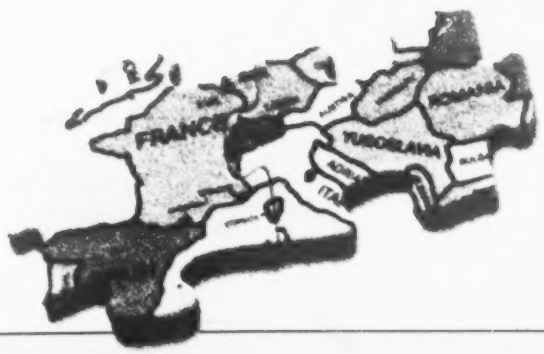


Figure 22

Foreign Direct Investment in U.S., 1988, $ Billions

Industry	Total World	UK	Neth	Other Europe	Japan	Canada	Rest of World
Manufacturing	121	37	17	38	12	9	8
Wholesale Trade	50	10	3	12	18	2	5
Petroleum	35	19	N/A	N/A	--	2	2
Real Estate	32	5	3	2	10	4	8
Insurance	20	7	5	4	N/A	3	N/A
Bank/Finance	20	4	6	1	7	2	--
Retail Trade	15	9	2	1	--	1	2
Mining	6	1	--	1	N/A	1	N/A
Other	30	10	N/A	N/A	5	3	5
Total	329	102	49	65	53	27	33

Source: Department of Commerce

Figure 23

Exports from Foreign Companies in U.S., 1985

	$ Billion
Total U.S. Exports	$219
Japanese Companies	23
French Companies	11
Canadian Companies	4
West German Companies	3
U.K. Companies	3

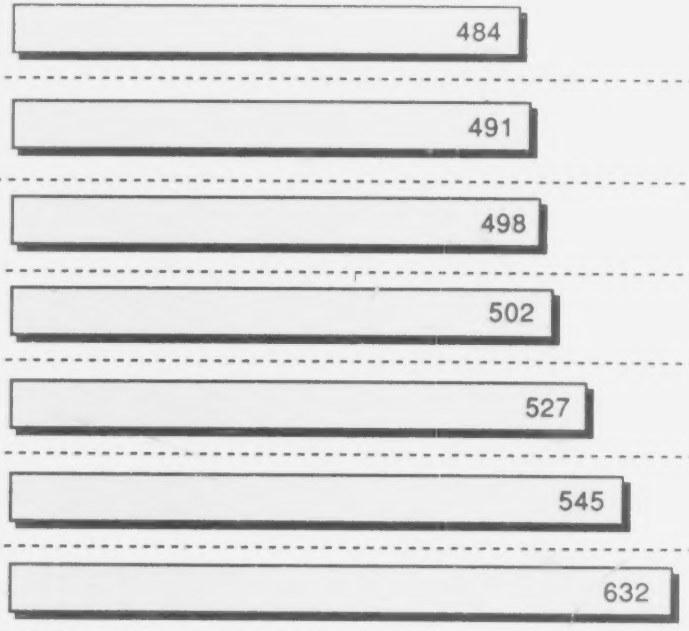
Source: Department of Commerce, JETRO

Figure 24

Figure 24 shows the U.S. comeback in steel economics. Though U.S. steel may not again compete well in far-flung markets, it can hold its own in the U.S. against offshore competitors. Japan is totally out of the competition as its labor costs approach those of the U.S. Those who continue to have a labor cost advantage lose it in capital and shipping costs.

Figure 24

Total Steel Costs (Landed in U.S.)
$ per Ton, November 1988



	Materials	Labor	Capital *	Shipping **
United States	291	160	33	0
Britain	295	104	21	71
South Korea	272	51	95	80
Taiwan	275	72	75	80
France	280	125	49	73
West Germany	288	127	58	72
Japan	297	150	105	80

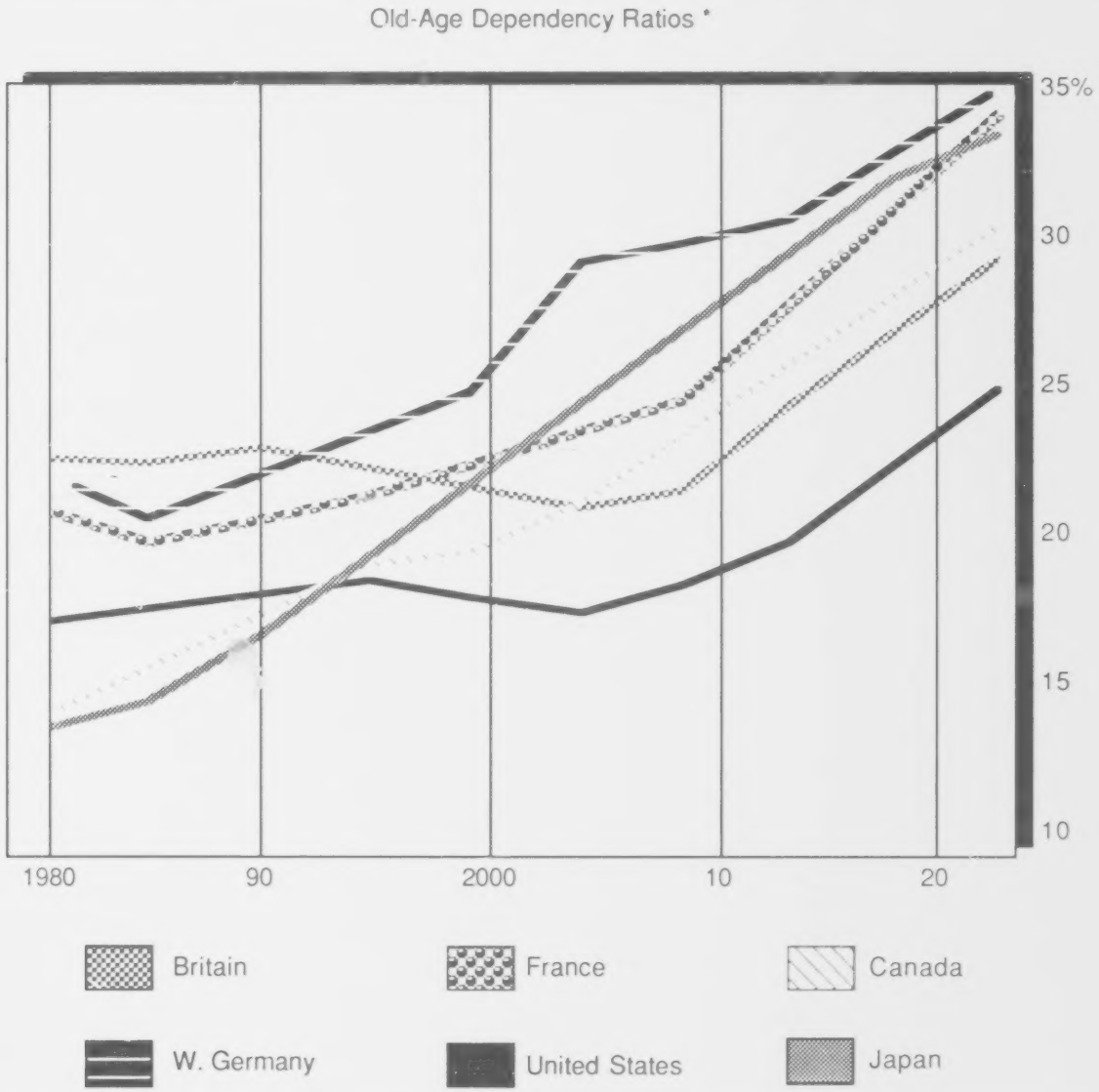
* Depreciation and interest
** Freight and customs duties
Sources: PaineWebber, American Iron & Steel Institute, *The Economist*

Figure 25

As mentioned above, Japan (in particular) and Germany have to face an aging population problem more severe than in the U.S. Figure 25 shows dependency ratios, population over 65 divided by population 15-64. Whereas the U.S. and European countries have institutions and habits to draw on, Japan essentially has to start from the beginning to create a retirement and support system. How they handle this will have a lot to do with their world competitiveness in the next century.

Figure 25

The Pensions Burden



* Ratio of population aged 65 and over to population aged 15-64
Source: OECD

Conclusion

The future is always interpreted with incomplete and conflicting data. There is no doubt the U.S. has many challenges anead. So do its major trading partners—especially economic integration in Europe and social problems in Japan. All of these nations will have to compete with some very effective and aggressive emerging countries.

The U.S. needs to do the "right things" regardless of what its competitors/partners do. This puts a primacy on greatly reducing the federal budget deficit. Whether or not this happens, U.S. companies will have to take their own initiatives to improve productivity and quality significantly. This alone does not guarantee success, but it is the part corporate executives can control. They also need to rethink the long-term handicap of a highly leveraged position. Short-term earnings and/or executive job security are, finally, not as important as balanced growth in investment, market share, and competitiveness in the markets they already know well.

Glossary of Terms Used in 'Perspectives'

Capacity Utilization

A widely used ratio that relates total capacity available to the portion of that capacity actually used during a designated period. For example: passenger seat-miles sold to seat-miles available.

Cash Flow

The net cash proceeds of a productive process; usually includes earnings, depreciation, and other non-cash expenses.

Capital Input

The value of gross physical and financial capital "employed" to achieve output. For a given year, the capital input is in essence an annualization of the current value of gross capital stock, financial stock, and working inventories.

Gross Domestic Product (GDP)

Comparable in concept and approach to Gross National Product, except that Domestic Product does not include overseas earnings or income of government or private sector entities.

Gross National Product (GNP)

The market value of the final output of goods and services generated by the nation's economy as of a specified time span, including values generated both in the national boundaries and in earnings from overseas. Excludes non-market items such as the efforts of a homemaker. GNP is a value-added concept, in that it measures for each input element the net contribution, excluding purchased inputs such as materials, energy and fuels, components and contract services, thus avoiding double counting.

Input

Inputs, as conventionally applied in productivity measurement, are expressions of the physical amount or the dollar value (cost) of the several elements utilized in production.

Labor Input

A measure of human involvement in production, and the most generally used input measure. May be expressed in terms of number of employees or number of hours worked during the designated period. In rare instances (such as GNP per capita) the "labor" input is simply the headcount of the non-institutional population.

Multifactor Productivity

Measures the relationship of more than one weighted input combined to output, defined as value added. Usually the relevant inputs are labor and capital, generating what is commonly known as total factor productivity. Purists point out that "total" must be reserved for conceptual aggregates that include quality of life aspects. The value of purchased materials, components, semi-finished products, fuels and energy is eliminated in the numerator and omitted in the denominator.

Output

At the plant and office level, outputs are often expressed in physical terms—i.e., tons of steel, linear feet of pipe, memos typed, etc. However, outputs are expressed in dollar terms for entities of the "macro economy."

Private Domestic Economy

Similar in approach and concept to GNP and GDP except that the relevant outputs of government (federal, state and local), non-profit entities and private households are excluded.

Productivity

Output of goods and services per unit of input of resources used in a process, ideally measured in physical volumes. May be cited for any level of a productive endeavor from a staff department or individual up to aggregate measures for a production plant, company, industry, or a total economy.

Purchasing Power Parity

A method for comparing dollar aggregates, such as outputs, between different countries. The domestic costs of a common set of commodities and services in each country and their national currency inflation rates are the building blocks. Better for longer term economic analysis than translation using volatile market exchange rates.

R&D

Research and development; expenses made to advance new products, services or processes with benefits to be received partly in future time periods.

Real

With effects of inflation removed; constant dollars. The opposite is "nominal" or "reported."

Standard of Living

A measure of quality of life across countries and regions. Common specific measures used are real GNP per capita and real compensation per hour.

Unit Labor Cost

The net increase in cost of a unit of labor for a business or agency. It is usually calculated from nominal compensation per hour growth less improvement (if any) in labor productivity during the same time period. The implication is that wage growth is costless to a business if labor productivity is improving just as rapidly.

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The Center's 1989 special publication includes case studies of the three winners: Globe Metallurgical, the Commercial Nuclear Fuel Division of Westinghouse, and Motorola, Inc. Also included are the quality philosophies of Jack Grayson, Center Chairman, and Curt Reimann, Associate Director for Quality Programs at the Department of Commerce's National Institute of Standards and Technology.

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